INCREASING REAL ESTATE MANAGEMENT PROFITS: HARNESSING DATA ANALYTICS

Watershed Real Estate Project

Project Overview

- • Obtain and extract elicit information about important variables relevant to the analysis.
- • Use MySQL database skills to extract important data from the real estate database.
- • Implement data analysis in Excel to identify the best opportunities for Watershed to increase revenue and maximize profits, while managing any new risks.
- • Create a Tableau dashboard to show Watershed executive the results of a sensitivity analysis.
- • Articulate a significant and innovative business process change for Watershed based on your data analysis, that you will recommend to company executives.

Elicitation

- The first thing to do is understanding the project's business need and that will help select the correct elicitation techniques and stakeholders.

Elicitiation Techniques:

- ❖ Brainstorming
- ❖ Document analysis
- ❖ Focus Group
- ❖ Interface Analysis
- ❖ Interviews
- ❖ Observation (job shadowing)
- ❖ Prototyping
- ❖ Requirements workshops
- ❖ Survey/questionnaire

Watershed wants to obtain following things and the business recommendation if they should change long term rental to short term:

- Calculate how much it would cost to convert and maintain each of this client's properties as a short-term rental.
- Determine the nightly rental price that would maximize the profits from each of these properties, if they were converted to short-term rentals. We would then like you to use this information to.
- Calculate which properties would have increased profits as short-term rentals.
- Determine how profitable, overall, it would be if Watershed converted some of this client's properties into short-term rentals.
- Determine how much cash Watershed would need in order to realize any potential profits from converting the properties.

Elicitation information extracted:

- The analysis should be constrained to the 244 properties owned by the one client.
- ·The occupancy rate of those 244 properties is 97.3% (or 36/37 months) when they are managed as long-term rentals.
- ·The initial capital required to convert a long-term rental property to a short-term rental property is $30,000 (for furnishings, linens, etc.). That capital expenditure will depreciate over 5 years.
- ·$6000 in cash will be needed for each property each year after the first (conversion) year to cover items that wear out quickly. This amount is treated as an expense and is not depreciated.
- ·Utilities will be $300 a month for each property, or $3600 a year.
- ·The hospitality fee (variable cost) for each visit (for key service, cleaning, etc.) will be $100, regardless of the actual number of days of a visit.

Elicitation information extracted:

- · The average short-term stay is 3 nights.
- · All the properties have the same capital expenditure and fixed costs.
- · 10% of the rental fee should be budgeted for potential regulatory and legal fees.
- · 20% of the rental fee should be budgeted for the online short-term rental provider (like Airbnb).
- · The two fees above are also combined and called the "transaction fee" in some spreadsheets and questions. The total default transaction fee is 30%.
- · All clients pay their rent on time.

Elicitation information extracted:
(aspects that need to be ignored on analysis)

- weekly or seasonal changes in rent or occupancy rate.
- · marketing strategies, like discounts or coupons.
- · special events during the year that might affect the rentals in one specific location.
- · loss in rent during the time interval when properties are being converted to short-term rental properties.

Data Extraction and Visualization

- The database is extracted using SQL queries using Jupyter notebook. The contains in the database such as fields in each table are determined by writing the queries and ERD as well as Relational schema is prepared with the help of ERDplus for knowing how the data is organized and get easy access for joining the tables. After that the queries are written for joining the tables and get whole data in csv format, which contains 244 rows.

Data Extraction

Queries

You can add as many "cells" as you need in order to explore the database and extract the appropriate data. For a reminder about what "cells" are, how to add them, or how to use Jupyter in general, please refer to the "How to Use Jupyter Notebooks" video at: https://www.coursera.org/learn/analytics-mysql/lecture/oxkUg/how-to-use-jupyter-notebooks.

In [3]:
```
%sql SHOW tables
```

```
 * mysql://studentuser:***@localhost/capstone
6 rows affected.
```

Out[3]:

Tables_in_capstone
location
property_type
st_property_info
st_rental_dates
st_rental_prices
watershed_property_info

Out[7]:

ws_property_id	location_id	city	state	zipcode	apt_house	num_bedrooms	kitchen	shared	current_monthly_rent	percentile_10th_price	percentile_
W1	L9531	Chapel Hill	NC	27514	apartment	2	Y	N	1060	114	
W10	L9533	Chapel Hill	NC	27517	apartment	2	Y	N	1200	111	
W100	L1944	San Francisco	CA	94129	apartment	1	Y	N	3300	108	
W101	L15257	Austin	TX	78702	apartment	1	Y	N	1400	178	
W102	L15257	Austin	TX	78702	apartment	2	Y	N	2000	221	
W103	L15257	Austin	TX	78702	house	1	Y	N	1600	202	
W104	L15257	Austin	TX	78702	house	2	Y	N	2800	197	
W105	L15260	Austin	TX	78705	apartment	1	Y	N	1100	114	
W106	L15260	Austin	TX	78705	apartment	2	Y	N	1900	80	

In [16]:
```
Capstone_data=%sql SELECT DISTINCT w.ws_property_id,w.location, w.property_type,w.current_monthly_rent,srp.percentile_10th_price,
```

```
 * mysql://studentuser:***@localhost/capstone
244 rows affected.
```

In [17]:
```
Capstone_data.csv('Capstone_data.csv')
```

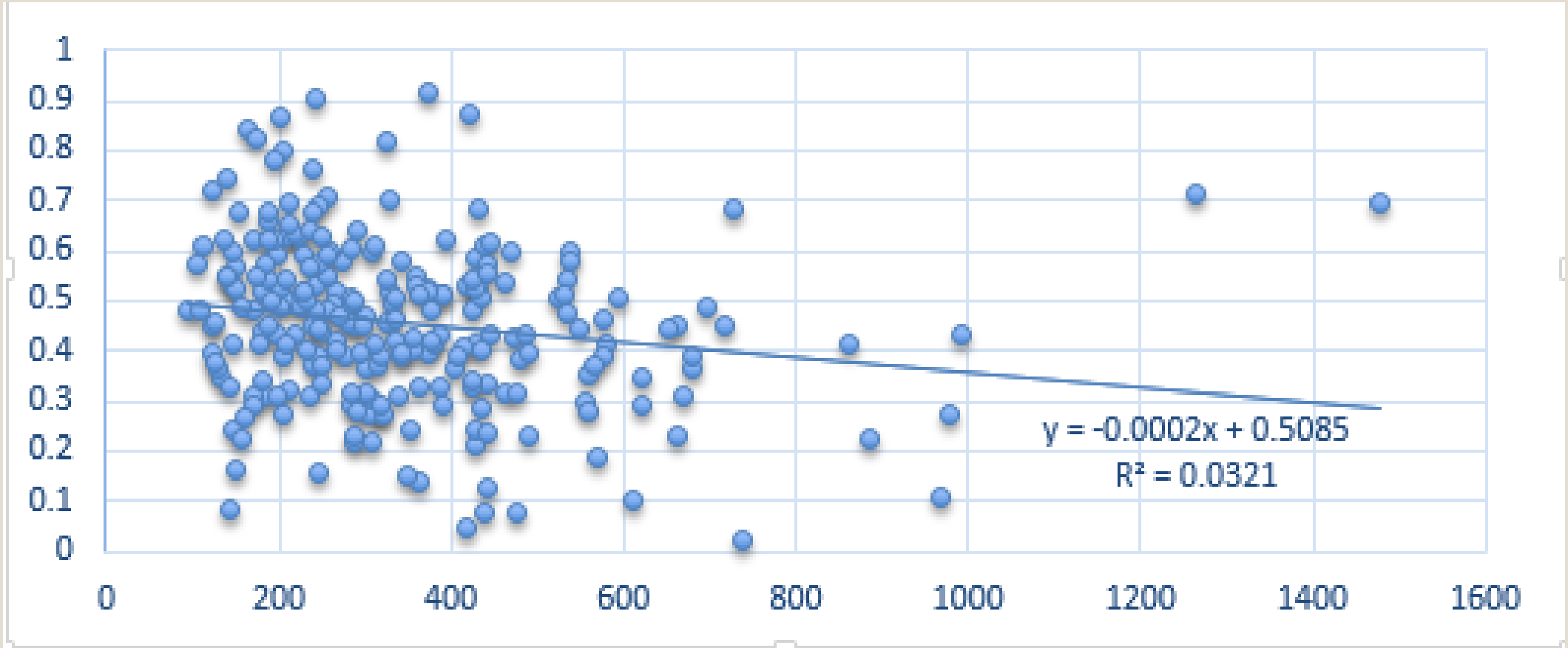
Out[17]: CSV results

Data Visualization

- Before any analysis or statistical modelling its important to look at the data understanding what they represent, to look for outliers, and to examine whether they contain any relationships. It is required for designing the model. This is done by visualizing the data in Tableau.

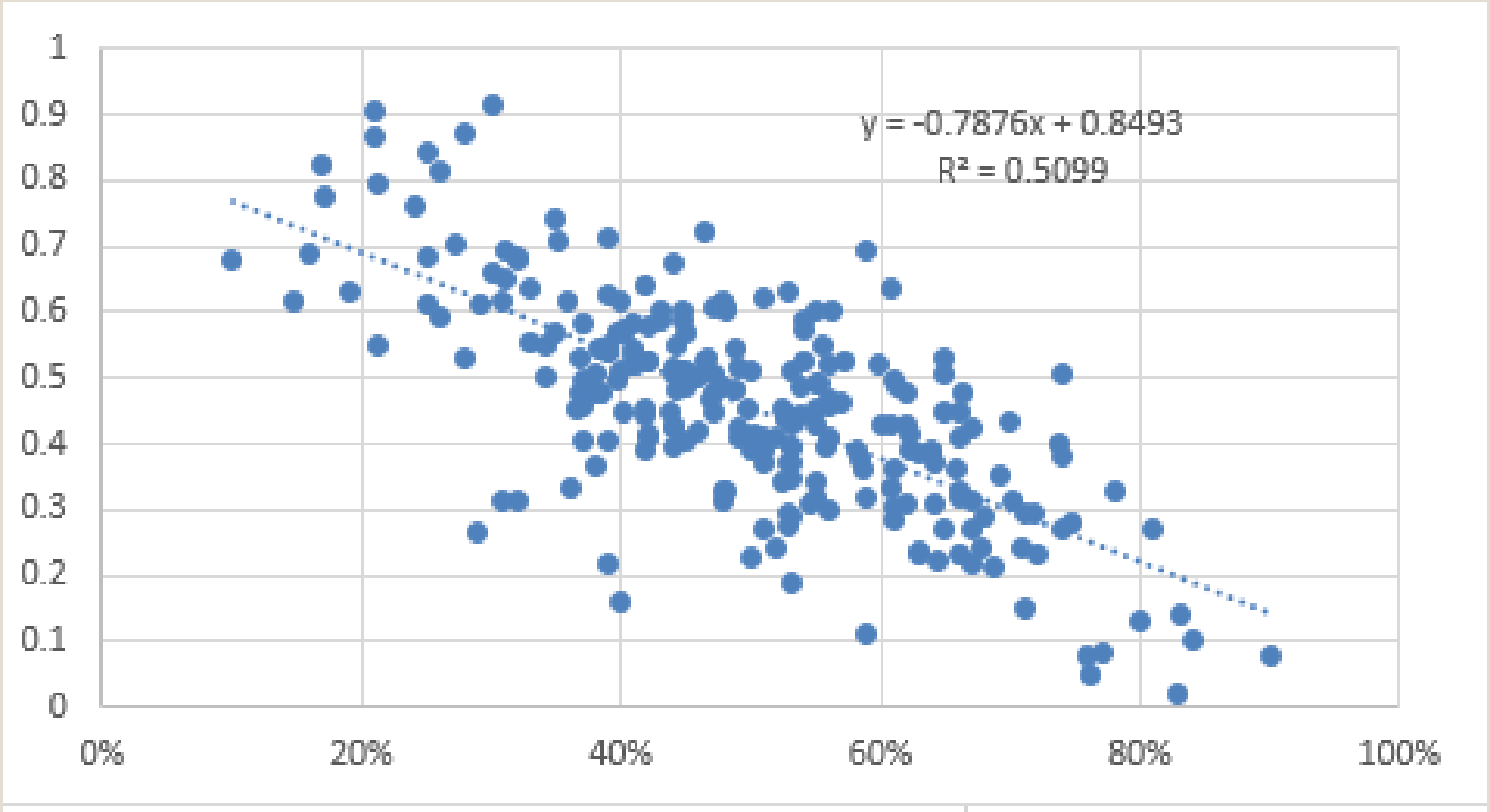
Implementation of data analysis in Excel

- In order to determine the best rent level for each property, we need to be able to forecast how the occupancy rate for that particular property varies as we change the rent. For that the data should be plotted and finding the parameters such as R-squared, slope etc.



Points are on the line with	
"Beta" (Slope) =	-0.0002
"Alpha" (y-intercept) =	0.5085

- The above best fit line doesn't give any relationship between occupancy rate and the rent because simply using these raw values cannot predict the relationship due to effect of other factors such as location. The standard deviation of the occupancy rates in the data is 16.3%, and the standard error of forecasts using our linear regression is 16.1% which is very high. So, for increasing the accuracy of the model 'Normalization' of the data is required. In this case, each comparable property is considered nightly rent in terms of how it compares to the rents of other properties of the same type in the same location. The data is used are the 10th percentile (low) and 90th percentile (high) rents for each of the 244 combinations of comparable property type and location. Following relationship (best-fit line) is obtained.


y = -0.7876x + 0.8493
R² = 0.5099
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0%
20%
40%
60%
80%
100%

- Now using model's parameters (the line's slope and y-intercept), along with given constraints, the optimal nightly rent (in dollars) that should be charged for the Watershed client's properties are predicted. The optimal rent is of course the rent level that would maximize total annual revenues, (the product of rent and occupancy rate multiplied by 365).

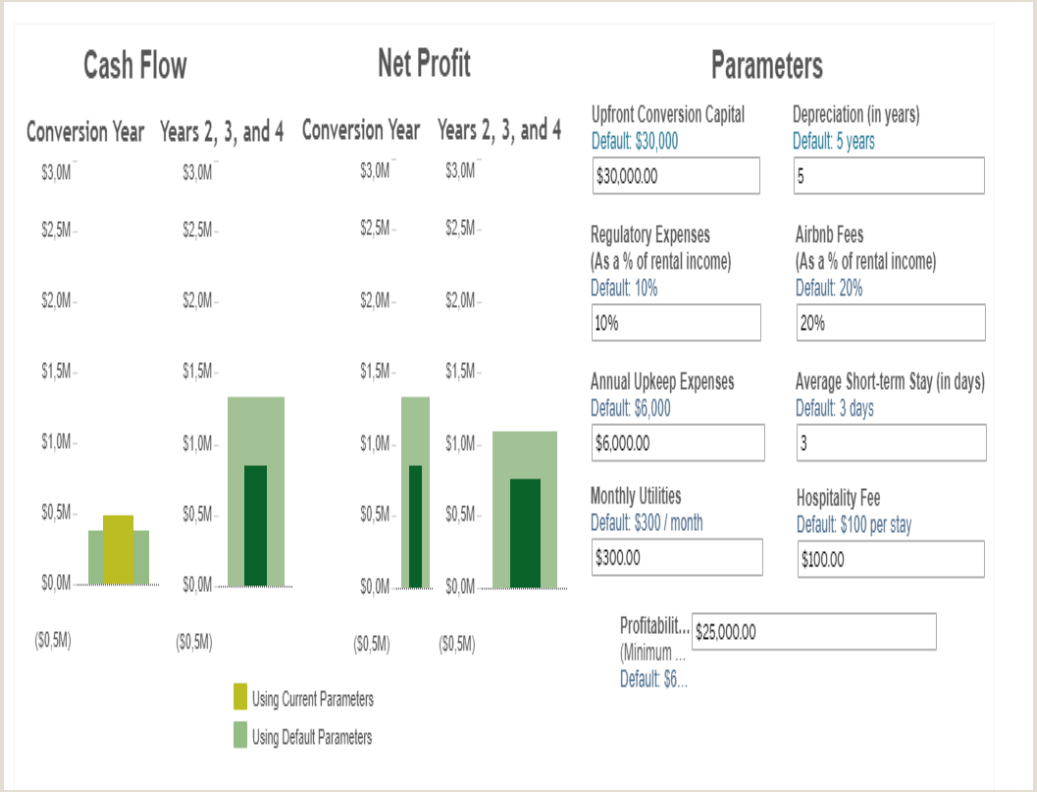
Optimization of Forecast ST Annual Revenues Before Transaction Costs:

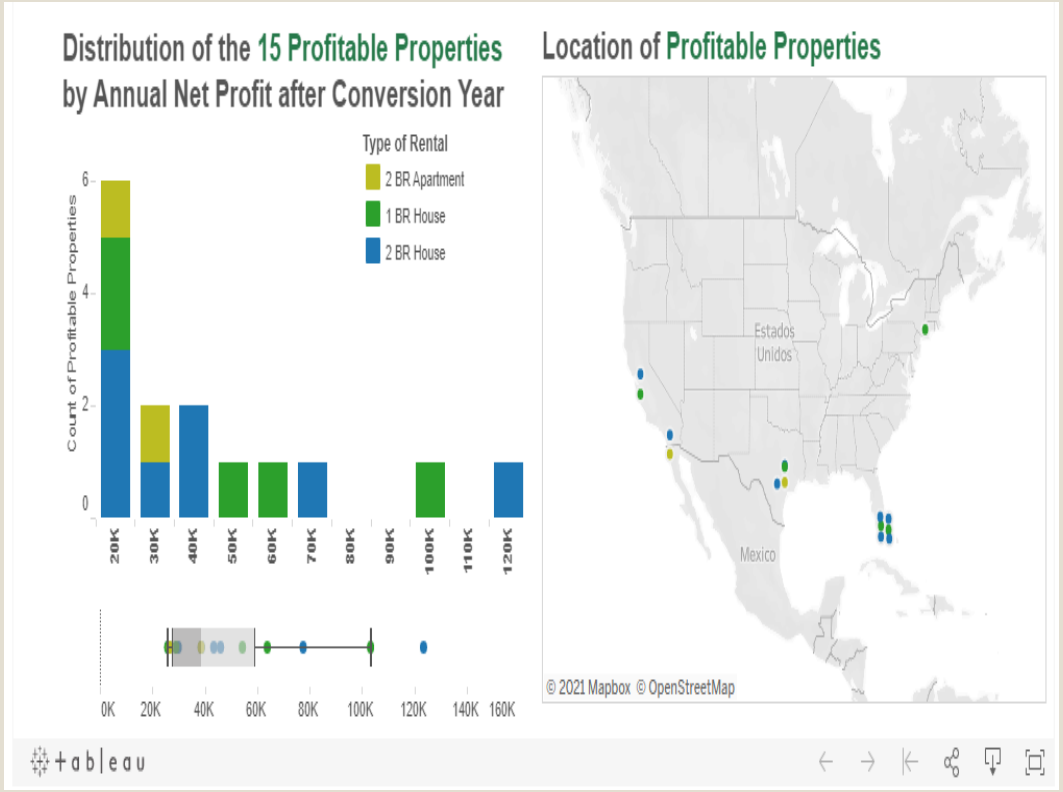
- The optimization of forecast short-term annual revenues done by using the Microsoft solver in the excel in such a way that the optimized value of ST annual revenue is obtained. This is done by using no occupancy data with rents of less than 10th percentile or greater than 90th percentile to build the model, the constrains are used to limit the answers to rent values between the 10th and 90th percentile. But for doing this, the same thing is repeated for 244 times for each row. So, the alternate method is used for calculating the optimized forecast ST annual revenues.

Calculations And Visualization

- The calculation of following measures are carried out using excel spreadsheet and also by using Tableau calculated fields.
- Yearly'Cash'Flow'(Conversion'Year)
- Yearly'Cash'Flow'(After'Conversion'Year)
- Yearly'Profits''(Conversion''Year)
- Yearly'Profits'(After'Conversion'Year)
- These are calculated by using the formulaes provided in Guided Spreadsheets of the course. The parameters are created in Tableau for fixed and dynamic variables which are assumed as instucted by the Watershed people. Also, the calculated fields ae created for obtaining the above measures. The interactive dashboard is created by which we can determine the behaviour of model by changing the dynamic parameters. The "Jittered" map is created for getting clear insight. Also, the total amount required for conversion of property from long term rental to short term is calculated. Sensitivity analysis is performed by chnaging the dynamic parameters.

Data Visualization





- From observing the values got from calculated fields, by assuming the provided values of parameters, the 41 properties are profitable out of 244. For this business model the combination of short and long term rentals can be applied i.e. changing profitable properties to short term rentals and non-profitable should not convert to short terms. Implimenting this the profit can be maximized.